

Developing Markets and Payments for Watershed Services



Why take a market-based approach?

Land use can significantly affect ecological functions such as water quality, flow, erosion control and sedimentation in downstream areas. However, those who own or manage upper watershed land often have little incentive to provide these services because the benefits occur downstream and because they do not receive compensation for providing them. There is growing interest in market-based payments because traditional regulatory approaches have not always provided incentives for conservation, and attempts to enforce good stewardship through regulations have often been ineffective. Development of incentives for appropriate land use practices therefore require finding ways for upstream landholders to be compensated for their costs.

Types of markets and payments for hydrological services

The principal approaches used as financial incentives to provide hydrological services fall into three broad categories that reflect different kinds of arrangements among buyers and sellers: Voluntary Contractual Arrangements, Public Payment Schemes, and Trading Schemes (see [Developing Markets for the Ecosystem Services of Forests](#)).

Voluntary Contractual Arrangements involve direct negotiations between buyers and sellers, or associations of buyers and sellers such as water users and landowners, which may also include public as well as private entities. These are illustrated by:

- The agreement of the [La Esperanza](#) hydropower producer in Costa Rica to pay the Monteverde Conservation League, an NGO that holds most of the upper catchment to maintain existing forest cover so as to maintain stable stream flows and reduce sedimentation. These kinds of deals may also be supplemented by funds from other kinds of voluntary contributions.
- In the case of [Quito, Ecuador](#), a trust fund was established to channel resources to conservation and watershed protection projects. The funds come from a fee charged to water users in their monthly bill.
- The [Valle del Cauca in Colombia](#) where irrigation farmers, concerned about low dry season flows and flow stabilization, formed water user associations, through which they voluntarily pay water user fees in addition to existing fees for water permits, that are collected by the regional environmental authority, Corporación Autónoma Regional del Valle del Cauca (CVC). These additional funds are solely used to fund the implementation of sub-watershed management plans developed by the CVC, which in turn contracts with upland communities, whose participation in the program is also voluntary, and who contribute to the development of specific management activities.

Public Payment Schemes can also be diverse. In these arrangements governments play a stronger role in establishing levels of payments and compensation, and provide a vehicle for greater public participation and transparency. These are not necessarily voluntary. Illustrations include:

- The [U.S. Conservation Reserve Program](#) and similar initiatives in Europe and China, in which direct payments are made to farmers for management practices that protect water quality and other ecosystem services;

- A requirement in [Colombia](#) where hydroelectric and water utilities pay an environmental services tax in which a fixed percentage of their revenues are allocated to an ecosystem fund that is used to pay private landowners for watershed management, and to purchase sensitive lands; and
- The establishment of a [Forest Benefit Compensation Fund](#) by the Chinese government for purposes of restoring forests in the Upper Yangtze basin in response to catastrophic flooding.

Trading schemes are inspired by government-imposed limits on pollutants or restrictions on water use. Companies and landowners can meet the requirements outright or they can buy or trade with others who have “credits” for exceeding the requirements. Examples include:

- The [Tar-Pamlico Trading Program](#) in the U.S., in which point source emitters such as industrial facilities and wastewater treatment plants can offset their loads by providing funding for best management practices on farms, which can be a more cost effective way to achieve reduction requirements; and
- [New South Wales](#), in Australia, where landowners can receive transpiration credits for planting trees that lower water tables in the lower catchment areas and help control naturally occurring salt levels.

In all approaches, governments and other intermediary organizations often play significant roles, which may include collecting and allocating funds, forming stakeholder associations to reduce transaction costs and provide technical assistance, establishing and enforcing property rights, and establishing verification procedures. They also provide education, which can increase willingness to pay for services. Markets and payments do not substitute for government regulations.

Efforts to avoid costly fines for violating regulations can often motivate the development of payment schemes. For example, when [New York City](#) was facing regulatory requirements from the federal government to build a water filtration plant, city officials negotiated payments to upstream landowners for better watershed management. They invested \$1.5 billion in a number of measures that included land conservation (\$40 million). This scheme cost far less than a filtration plant (the proposed plant was estimated to cost \$6-8 billion including annual operating costs) and allowed the city to meet the federal requirements for water quality.

Issues to consider in assessing opportunities

Key questions that need to be considered when evaluating and selecting appropriate arrangements are outlined in [Developing Markets for Water Services from Forests](#). Some specific questions that need to be considered by innovative practitioners are:

- Site-specific biophysical relationships between land and water that determine levels of dry season flow and flooding, including the scale at which these are significant;
- Relative significance of the impacts of all management practices – for example, levels of sedimentation depend not only on tree cover, but also on the existence of ground cover vegetation, road building, and construction activities. Increased levels may also not be significant in areas where pre-existing natural sedimentation rates are relatively high.
- Significance of actual or potential damages to various stakeholders – for example, damages from flooding and sedimentation will depend on the vulnerabilities of various stakeholders and downstream land uses, particularly the presence of irrigation, hydropower facilities and downstream urban areas located in floodplains.
- Existing rights to watershed services and responsibilities for management practices that ensure their provision, whether these are regarded as fair by stakeholders, and whether these remain to be defined;

- Transaction costs associated with the establishment and enforcement of payment arrangements, and ways these can be reduced;
- Effectiveness of proposed management measures and identification of uncertainties – this is critical for managing stakeholder expectations.

As a general rule, contractual arrangements among private parties tend to be more effective at smaller scales where the causes and effects of land management decisions are more certain, benefits are more tangible, stakeholders are more identifiable, and agreements can be better tailored to unique local circumstances. At larger scales, there is a greater role for government and other intermediary organizations. Communicating possible benefits and risks to stakeholders and engaging them early in the decision process can help to develop trust and gain their cooperation.

References:

Calder, Ian R. 1999. *The Blue Revolution: Land Use and Integrated Water Resources Management*. London: Earthscan. For summary information, table of contents and purchasing information, see: <http://www.earthscan.co.uk/asp/bookdetails.asp?key=2013>

FAO, [Land-Water Linkages in Rural Watersheds Case Study Series](#). Presented at electronic workshop on September-October 2000.

Johnson, Nels, Andy White, and Danièle Perrot-Maitre. 2001. [Developing Markets for Water Services from Forests: Issues and Lessons for Innovators \(pdf\)](#). Washington, DC: Forest Trends, World Resources Institute, The Katoomba Group.

Landell-Mills, N. and Porras I. 2002. “[Silver Bullet or Fools’ Gold](#)” (Executive summary only - full report can be purchased from www.Earthprint.com) International Institute for Environment and Development (IIED), London. Reviews 61 case studies of the development of markets for watershed services.

National Research Council. 1999. [Watershed Management for Potable Water Supply](#). Washington, DC: National Academy Press.

Pagiola, S., Bishop J. and Landell-Mills N. 2002. *Selling Forest Environmental Services: Market-Based Mechanisms for Conservation and Development*. For summary information, table of contents and purchasing information, see: <http://www.earthscan.co.uk/asp/bookdetails.asp?key=3752>

Perrot-Maitre, Danièle, and P. Davis. 2001. [Case Studies: Developing Markets for Water Services from Forests \(pdf\)](#). Washington D.C.: Forest Trends.

Powell, I., White A. and Landell-Mills N. 2002. [Developing Markets for the Ecosystem Services of Forests \(pdf\)](#). Forest Trends, Washington D.C.

Tognetti, Sylvia S. 2001. [Creating Incentives for River Basin Management as a Conservation Strategy: A Survey of the Literature and Existing Initiatives](#). Washington, DC: U.S. World Wildlife Fund.

FAO (2002) [Synthesis report of FAO electronic workshop on Land-Water Linkages in Rural Watersheds \(pdf/zip\)](#) in: Land-water linkages in rural watersheds. Land and Water Bulletin No. 9, Rome.

Links:

[System-wide Program on Collective Action and Property Rights](#). CAPRI intends to contribute to policies and practices that alleviate rural poverty by analyzing and disseminating knowledge on the ways that collective action and property rights institutions influence the efficiency, equity, and sustainability of natural resource use.

[FLOWS](#) A prototype online portal for the dissemination, synthesis and exchange of information on markets for environmental services. Includes information for subscribing to Flows Listserve.

[Institute for Environment and Development \(IIED\), Environmental Economics Programme](#)

[Land Use and Water Resources Research](#) (an on-line journal).

[UN Food and Agriculture Organization \(FAO\) Land and Water Division](#)

International Water Supply and Sanitation Center (IRC), [Community Water Supply Management](#). Contains case studies on community management of rural water supply systems.